FABRICATION OF SEMI AUTOMATIC GLASS CUTTING MACHINE BY USING DIAMOND TOOL

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ABSTRACT: Now a days glasses are cutting manually or CNC automatic programming. But the manually operation is the very dangerous , because the dimension or marking will change due to wrong alignment or sense of sight and operator’s error. So we require the skilled labour. So our project deals how to reduce the labour cost and how to increase the accuracy of the cutting. But in the automatic CNC machine the above difficulties are not induced. But the cost of CNC machine is high. So we can use the “FABRICATION OF SEMI AUTOMATIC GLASS CUTTING MACHINE”. It is very accurate cutting in taper angles and also the straight line, square or rectangular cutting. In future we can produce it for fully automatic and also rotary motion. All the above things are explained briefly in our project.

KEYWORDS: Diamond tool, mirror, Gears, sliding part, Upper mating part, cross rail, tool head, Prime mover

INTRODUCTION:

Now a days the glass manufacturing & cutting Technology are well developed. But this technology & development is only useful to the large scale industries. Because of high investment on CNC machine. Small Scale Industries cannot afford for CNC machines, they utilize human labour for glass cutting, marking, etc. And so the small scale industries depend on the labour for their cutting work. Due to this manual work the accuracy is affected and the material handling &labour cost is too high. There is no enough safty for the labour . So as to overcome the mentioned bottlenecks, there arise a need for economical glass cutting machine.

CONSTRUCTION COMPONENTS AND DESCRIPTION BASE:

It is made up of wood, which hold the hole arrangement of this machine.

SLIDING PARTS:

It is made up of mild steel. It is used to convert the rotary motion of lead screw into sliding motion of column. It is also holds the column. The lock nut is engaged the upper mating part.

LEAD SCREW:

It is made up of mild steed. It has right hand thread. The lead screws used to convert the power of speed reduction gear box into sliding part. At the end of the lead screws pulleys are fixed. The pulleys are connected by V-belts. And one lead screw is connected to the speed reduction box by using coupling.
COLUMN:
It is made up of mild steel, which support the cross rail. It is fixed above the cross rail.

CROSS RAIL:
It is made up of mild steel, which hold the tool head.

TOOL HEAD:
It is made up of mild steel which holds the Diamond tool.

TABLE:
It is made up of mild steel. The clamping devices are fitted in this table. The table is fixed on the center shaft.

WORM AND WORM GEAR SHAFT:
It is made up of Mild Steel. The worm gear is fixed in center shaft. Worm shaft is connected to the handle. When worm is rotated 5 times by the handle, the worm gear turns 90°.

MOTOR:
It is 0.5 HP motor. 980 rpm. It is fixed on separate table. If in future as per need it can be changed for the requirements.

SPEED REDUCTION GEAR BOX:
It is used to reduce the rpm in 70:1 ratio. It is connected to the motor shaft by using V-belt. If in future as per need it can be changed for the requirements.

TOOL:

BLOCKDIAGRAM:
WORK PREPARATION:

The corners of the glass should be free from damages, cracks. Using glass marking pencil just highlight the starting point. Ensure proper electric power supply before starting the work. If in future as per need it can be changed for the requirements (any elements in machine).

WORKING PRINCIPLE:

Place the glass which is to be cut on the table, adjust the clamping device gently to impart enough clamping force to hold the glass rigidly while cutting. Adjust the drop down depth of the tool by resting the tool directly on the top surface of the glass where already marked with pencil. Clamp the tool in that position exactly with the provided fastener. Switch on the motor power supply. By using LIMIT CONTROL SWITCH the can be moved to the desired length on the glass plate both in front and reverse directions. The power is transmitted from the motor to speed reduction gear box, then from that gear box to lead screw which is connected by means of coupling. There are two lead screws at either sides of the column driven uniformly with help of pulley arrangement at the rear end. The drive from the lead screw is transferred from to the upper mating part through the locknut. The front and back moment of the tool is obtained due to sliding of the column over the sliding arrangement. Scoring on the glass will happen while the tool glides over the glass plate with the cutting pressure.

Using worm and worm wheel mechanism the table can be rotate to any degree to perform angular glass cutting. For a circular cuts the tool is held stationary at a distance(radius) with the cutting pressure on the glass with respect to a desired center, the table is rotated with a uniform speed. Based on the requirement desired shapes can be cut with a little effort and operating skill. After the completion of the cut the tool should be raised up and move to the initial position, then slide to be moved to the rear end. Now the glass can be off loaded from the fixtures by loosening the clamping screws.

APPLICATION:

- It can be use in any industry.
- It can be used for interior & decoration works.

ADVANTAGES:

- Accurate cutting compare to hand cutting
- We can produce the taper lines for required angle
- Not need of skilled labour
- Low cost compare to CNC machine
- Cut the rectangular or square glass pieces

DISADVANTAGES:

- Partially Manually operated

LIMITATIONS:

- The maximum size of the glass to be hold is 280x280 mm (Square)
- The minimum size of the glass to be hold is 180x180 mm (Square)
- The thickness of cut can be obtained within 2-20 mm

CONCLUSION:

This project work help us to learn more about Designing, machining process, material handling, material selection, process planning, cost estimation etc...And our project was successfully satisfying the intended purpose of design and manufacturing.

REFERENCE: